

PAGE 1 PROC14/LIB:DRO.PROCID

MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS -  
SATURDAY, AUGUST 7, 1982 -- 3:52:56 PM

07AUG82 15:52

UNIVERSAL ASSEMBLER VERSION 3.1 FEBRUARY 29, 1980 (IN-HOUSE)

C O N F I D E N T I A L   P R O P R I E T A R Y   I N F O R M A T I O N

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COMMAND LINE WAS: SNAP3 PROC14.PROCID,,PROC144;GQPLX

INCLUSION A: PROCINC/TXT:DRO  
INCLUSION B: PROC14/LIB:DRO.PMACMIC  
INCLUSION C: PROC14/LIB:DRO.GMACROZ  
INCLUSION D: PROC14/LIB:DRO.PROCEQUS  
INCLUSION E: PROC14/LIB:DRO.BDEF1800  
INCLUSION F: PROC14/LIB:DRO.MDEF1800  
INCLUSION G: PROC14/LIB:DRO.PORTEQUS  
INCLUSION H: PROC14/LIB:DRO.PORTASGN  
INCLUSION I: PROC14/LIB:DRO.PROCP4

D 20.A

CAPIVS EQU 0

INVERTED DISPLAY SCREEN VERSION \*\*NEW\*\*

\*\*\* ERRORS: 0

PROGRAM NAME: PROCID

PROGRAM ADDRESS BLOCKS: 010000 /ABSOLUTE/ SIZE=000000 (ABS)  
167400 /SYSIVR/ SIZE=000400 (ABS)  
170000 /SYSROM/ SIZE=000047 (ABS)  
000000 /PID/ SIZE=001000 (REL)

EXTERNAL REFERENCES (UNDEFINED SYMBOLS):

|       |      |       |        |        |         |        |        |        |        |      |       |
|-------|------|-------|--------|--------|---------|--------|--------|--------|--------|------|-------|
| UDPOP | SLC  | RETCC | AP4    | INCX   | LD6     | RETURN | INFO   | BFAC   | SRC    | INCP | INCPA |
| BETA  | BT   | SIRO  | DECX   | DS     | ALPHA   | BFSB   | SRE    | DECP   | DECPA  | DI   | BCP   |
| CCS   | NOJ  | DL    | EI     | PUSHI  | BP      | REGS   | DLHL   | POP    | MIN    | SIRX | STKS  |
| SC    | PUSH | MOUT  | BRL    | BFS    | STL     | JUMPCC | INPUT  | CALLCC | PIN    | JUMP | PLR   |
| CALL  | PSR  | EXADR | EXSTAT | EXDATA | EXWRITE | EXCOM1 | EXCOM2 | EXCOM3 | EXCOM4 | UDOP | BEEP  |

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CLICK LODCF SYSTAT APS AP7 FETCHI LDS LD7 L7S

UNUSED LABELS:

PID JMPTBL

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS -  
• MICRO PROCESSOR INSTRUCTION DEFINITIONS

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3.

INC PROCINC

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52

• UNDEFINED UNUSED PORTS, SUBS, & BITS

14.A

15.A

16.A

\* TYPE SNAPOPT X  
EQU 4 DEFINE VERSION OF MACHINE TO BE ASSEMBLED  
INC PROC14.PORTASGN PORT ASSIGNMENT DISPLAY

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52

• THE PORT ASSIGNMENTS, ORGANIZED BY PORT - SUPPORT NUMBER IN IN/OUT PAIRS

3.H

4.H

5.H

6.H

7.H

8.H

9.H

10.H

11.H

12.H

13.H

14.H

15.H

16.H

17.H

18.H

19.H

20.H

21.H

22.H

23.H

24.H

25.H

26.H

27.H

28.H

29.H

30.H

31.H

32.H

33.H

34.H

35.H

36.H

37.H

38.H

39.H

40.H

41.H

42.H

43.H

44.H

45.H

46.H

47.H

48.H

49.H

50.H

51.H

\*  
 • PORT  
 • SUB 0 1 2 3 4 5 6 7  
 • 0 O LIREG LIMP BASW MODW STW LUF LUOF  
 • 0 I MODIN INBUS MIFIN SDLCIN ACUIN  
 • 0 O IIIMP DIMP COMF CHUF IMAR DMAR  
 • 10 I  
 • 1 O OTBUS MDW LSPKR SDLCOT ACUOT SDLCMD MIFADR MIFDAT  
 • 0 I SRVREQ STATUS IDCIDL IDCODH UCFLG MDR STEK  
 • 1 O MIFSTB MIFIAK MIFSTB2 SINS SIOD CSRF CSTF SOTS  
 • 10 I  
 • 2 O LDCH LDMAP SKCH SDLM KBSC RDLM CMPP SMR  
 • 0 I KBDD SNID  
 • 3 O URFO I  
 • 4 O URO (MR2XXL)  
 • I MARIL  
 • 5 O URO (MR2XXH)  
 • I MARIH  
 • 6 O MAROL (XX2MRL)  
 • I URI  
 • 7 O MAROH (XX2MRH)  
 • I URI  
 •  
 • USER IO PORTS 4-7  
 • REGS 0 URA URB URC URD URE URH URL URX  
 • 10 PCH PCL SPH SPL PSW I35 I02 IMP  
 • \*  
 • .SUBITS 0 1 2 3 4 5 6 7  
 • .SRVREQ: SCPMEM SCMBUS SCSDLCR SCSDLCT SCDSPLN SCONMS SCHUMS  
 • .STATUS: STUSCF STIODR STPFIN STPFOUT STKBKC STKBNS STKBRDY STBOTLN  
 • .MODW: SWINTE SWBASD SWUSER SWSTDY SWRPT SWALBT  
 • .STEK: STLA STLW STLSP  
 •

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\* THE PORT ASSIGNMENTS, ORGANIZED BY PORT - SUPPORT NUMBER IN IN/OUT PAIRS

52.H

53.H

54.H

55.H

56.H

57.H

58.H

59.H

60.H

61.H

62.H

63.H

64.H

65.H

66.H

17.A

1.I 000002

2.I 000014

3.I

4.I 000004

5.I

6.I

7.I

8.I

9.I

10.I

11.I

\* JUMP INPUT CONDITION CODES ARE:

.SELECT 0 1 2 3 4 5 6 7

. CARRY ZERO MEMRDY PARITY IMPZERO IMPODD BUSRDY TRUE

\* DOUBLY NAMED (SUB)PORTS ARE:

. URO <> MR2XXL

. URO <> MR2XXH

. MAROL <> XX2MRL

. MAROH <> XX2MRH

. INC PROC14.PROCP4

VER EQU 2 INDIRECT TO PARAMETER FILE  
1800 - INFO INSTRUCTION PROCESSOR NUMBER

REV EQU 014 INFO INST. MICRO-CODE REVISION NUMBER

. TYPE EQU 4 =0 FOR 1800 PROCESSOR (DISK, ICA)

. =1 FOR 1871 PROCESSOR (DISK, ICA, APP/AML)

. =2 FOR 3800 PROCESSOR (ICA)

. =3 FOR 3802 PROCESSOR (RIM)

. =4 FOR 38MP PROCESSOR (IMA)

\* SNAPORT X

\*

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• EXTENDED CONDITIONS, AND SYSTEM REGISTER DEFINITIONS

|             |        |   |  |
|-------------|--------|---|--|
| 14.I        |        | *   |  |
| 15.I        |        | • CONDITION CODES                             |  |
| 16.I        |        | •   |  |
| 17.I 020002 | MO     | EQU F6+2                                      | MEMORY READY   |
| 18.I 020003 | MP     | EQU F6+3                                      | MEMORY FAILURE (OF ANY SORT!)  |
| 19.I 020004 | IZ     | EQU F6+4                                      | IMPLICIT REGISTER ZERO   |
| 20.I 020005 | IO     | EQU F6+5                                      | IMPLICIT REGISTER ODD  |
| 21.I 020006 | BR     | EQU F6+6                                      | BUS READY (MICRO-BUS ONLY)   |
| 22.I        | *      |   |  |
| 23.I        |        | • REGISTER ALLOCATION                         |  |
| 24.I        |        | •   |  |
| 25.I 010002 | Q      | EQU F5+02                                     | NOBODY SHOULD DO WRITE'S TO Q  |
| 26.I        |        | •   |  |
| 27.I 010000 | PDLNP  | EQU F5+0                                      | DISPLAY LINE POINTER   |
| 28.I 010001 | KBSCNT | EQU F5+01                                     | KEYBOARD SCAN COUNTER  |
| 29.I 010002 | SCANSV | EQU F5+02                                     | KEYBOARD SAVED SCAN NUMBER, REPEATED AI                                  |
| 30.I        | *      |   |  |
| 31.I        |        | • DISKETTE CONTROL REGISTERS                  |  |
| 32.I        |        | •   |  |
| 33.I 010003 | MADR   | EQU F5+03                                     | DISKETTE DEVICE ADDRESS  |
| 34.I 010004 | MBITS  | EQU F5+04                                     | DISKETTE I/O CONTROL, FUNCTION & STATUS                                  |
| 35.I 010005 | MBSTAT | EQU F5+05                                     | DISKETTE STATE CONTROL LINK REGISTER                                     |
| 36.I 010006 | MCRCH  | EQU F5+06                                     | DISKETTE CRC GENERATOR STORAGE REG.                                      |
| 37.I 010007 | MCRCL  | EQU F5+07                                     | DISKETTE CRC GENERATOR STORAGE REG.                                      |
| 38.I 010010 | MDSKS  | EQU F5+010                                    | DISKETTE HEADER READ SECTOR NUMBER                                       |
| 39.I 010011 | MDSKT  | EQU F5+011                                    | DISKETTE HEADER READ TRACK NUMBER  |
| 40.I 010012 | MTRAK  | EQU F5+012                                    | DISKETTE USER DESIRED TRACK NUMBER                                       |
| 41.I 010013 | MSECT  | EQU F5+013                                    | DISKETTE USER DESIRED SECTOR NUMBER                                      |
| 42.I        | *      |   | * APF VERSION ABOVE 2 BYTES IN MEMORY *                                  |
| 43.I        | *      |   |  |
| 44.I        |        | • HONEYWELL-APF DMA CHANNEL CONTROL REGISTERS |  |
| 45.I        |        | •   |  |
| 46.I 010013 | APFRP  | EQU F5+013                                    | APF RECEIVER POINTER LSB   |
| 47.I 010014 | APFRK  | EQU F5+014                                    | APF RECEIVER COUNTER LSB   |
| 48.I 010015 | APFTP  | EQU F5+015                                    | APF TRANSMITTER POINTER LSB  |
| 49.I 010016 | APFTK  | EQU F5+016                                    | APF TRANSMITTER COUNTER LSB  |
| 50.I        | *      |   |  |
| 51.I        |        | • AUDIO CHANNEL CONTROL REGISTER              |  |
| 52.I        |        | •   |  |
| 53.I 010015 | ACD    | EQU F5+015                                    | AUDIO CHANNEL ATTEN/VALUE  |
| 54.I 010016 | ACPL   | EQU F5+016                                    |  |
| 55.I 010017 | ACPH   | EQU F5+017                                    | AUDIO CHANNEL CONTROL & MSB POINTER                                      |
| 56.I 010017 | ACCTL  | EQU ACPH                                      | APF - AUDIO CHANNEL 1 BYTE CONTROL<br>(ACPH & ACCTL SHOULD BE SAME REG.) |
| 57.I        | *      |   |  |

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 • EXTENDED CONDITIONS, AND SYSTEM REGISTER DEFINITIONS

|             |         |                  |  |
|-------------|---------|------------------|--|
| 58.I        |         |                  |  |
| 59.I        |         |                  |  |
| 60.I        |         |                  |  |
| 61.I 030000 | LINK    | EQU F5+F6+00     | SUBROUTINE CALL AND RETURN LINKAGE REGS        |
| 62.I 030001 | TEMPI   | EQU F5+F6+01     | PROCESSOR EMULATION TEMPORARIES                |
| 63.I 030002 | TEMP2   | EQU F5+F6+02     |  |
| 64.I 030001 | TEMPH   | EQU TEMP1        | H & L ONLY FOR DOUBLE H/L MACROS               |
| 65.I 030002 | TEMPL   | EQU TEMP2        |  |
| 66.I        | *       |                  |  |
| 67.I        |         |                  | • COMMUNICATIONS CHANNEL CONTROL REGISTERS     |
| 68.I        | *       |                  |  |
| 69.I 030003 | RSTAT   | EQU F5+F6+03     | COM RECEIVER STATUS                            |
| 70.I 030004 | RPNTR   | EQU F5+F6+04     | COM RECEIVER MEMORY POINTER                    |
| 71.I 030005 | RDATA   | EQU F5+F6+05     | COM RECEIVER DATA                              |
| 72.I 030006 | RCRCH   | EQU F5+F6+06     | COM RECEIVER CRC GENERATOR STORAGE AREA        |
| 73.I 030007 | RCRCL   | EQU F5+F6+07     | COM RECEIVER CRC GENERATOR STORAGE AREA        |
| 74.I 030010 | UXPNTR  | EQU F5+F6+010    | USER TRANSMIT BUFFER POINTER                   |
| 75.I 030011 | COMMODE | EQU F5+F6+011    | COMMUNICATION MODE CONTROL REGISTER            |
| 76.I 030012 | URPNTR  | EQU F5+F6+012    | USER RECEIVE BUFFER POINTER                    |
| 77.I 030013 | XSTAT   | EQU F5+F6+013    | COM TRANSMITTER STATUS                         |
| 78.I 030014 | XPNTR   | EQU F5+F6+014    | COM TRANSMITTER MEMORY POINTER                 |
| 79.I 030015 | XDATA   | EQU F5+F6+015    | COM TRANSMITTER DATA                           |
| 80.I 030016 | XCRCH   | EQU F5+F6+016    | COM TRANSMITTER CRC GENERATOR STORAGE          |
| 81.I 030017 | XRCL    | EQU F5+F6+017    | COM TRANSMITTER CRC GENERATOR STORAGE          |
| 82.I        | *       |                  |  |
| 83.I        |         |                  | • INTERNAL MULTI-PORT ADAPTER CONTROL REGISTER |
| 84.I        | *       |                  |  |
| 85.I        |         |                  |  |
| 86.I 010013 | COMMODE | EQU F5+F6+011!!! | COMMUNICATIONS MODE                            |
| 87.I 030003 | TRNFCN  | EQU F5+013       | TX CONTROL LINE SHADOW                         |
| 88.I 030004 | TRNCHN  | EQU F5+F6+03     | TRANSMITTING CHANNEL NUMBER                    |
| 89.I 030005 | TRNDTA  | EQU F5+F6+04     | TRANSMITTING CHANNEL DATA                      |
| 90.I 030006 | TRNCTL  | EQU F5+F6+05     | TRANSMITTING CHANNEL CONTROL                   |
| 91.I 030007 | TRNSEL  | EQU F5+F6+06     | TRANSMITTING CHANNEL SELECTION                 |
| 92.I 030010 | RCVCTL  | EQU F5+F6+07     | RECEIVER CONTROL REGISTER                      |
| 93.I 010014 | RCH0C   | EQU F5+F6+010    |  |
| 94.I 030012 | RCH0D   | EQU F5+014       | SWAP OUT WITH COMMODE                          |
| 95.I 030013 | RCH1C   | EQU F5+F6+012    |  |
| 96.I 030014 | RCH1D   | EQU F5+F6+013    |  |
| 97.I 030015 | RCH2C   | EQU F5+F6+014    | RECEIVER CHANNEL & DATA REGISTERS              |
| 98.I 030016 | RCH2D   | EQU F5+F6+015    |  |
| 99.I 030017 | RCH3C   | EQU F5+F6+016    |  |
|             | RCH3D   | EQU F5+F6+017    |  |

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• EXTENDED CONDITIONS, AND SYSTEM REGISTER DEFINITIONS

```

100.I
101.I
102.I
103.I
104.I
105.I
106.I
107.I
108.I
109.I
110.I
111.I
112.I
113.I
114.I
115.I 000000
116.I 000002
117.I 000000
118.I 000000
119.I 000000
120.I 000000
121.I 000100
122.I 000000
123.I
124.I
125.I 000102
126.I
127.I
128.I
129.I 000000
130.I 002000
131.I 004000
132.I 006000
133.I 007000
134.I
135.I 000000
18.A 000111
19.A
20.A 000000
21.A
4.

* CAPABILITY BITS:
* THESE BITS DEFINE THE VERSION OF THE 1800/3800 PROCESSOR THAT THIS IS FOR
* XX XXX XXX
* 0 ---- MICRO I/O BUS AVAILABLE
* 1 ---- 1500 SINGLE DENSITY DISKETTE DRIVE AVAILABLE
* 2 ---- 1800 SINGLE/DDOUBLE DISKETTE DRIVE AVAILABLE
* 3 ----- APF SPECIAL MICRO-BUS INTERFACE AVAILABLE
* 4 ----- INTERNAL MULTIPORT ADAPTER AVAILABLE
* 5 ----- INBOARD RIM AVAILABLE
* 6 ----- 5500 I/O BUS AVAILABLE
* 7 ----- COMMUNICATIONS INTERFACE AVAILABLE (ASYNC, BISYNC, & SDLC)

* *PROCESSOR*
CAPMICR EQU 0<0 YES YES YES
CAPIMA EQU 1<1
CAPBLUE EQU 0<2 YES YES YES
CAPAPF EQU 0<3
CAPDPIO EQU 0<4
CAPRIM EQU 0<5 YES YES YES YES
CAP55IO EQU 1<6 YES YES YES YES
CAPCOM EQU 0<7 YES YES YES YES

* *TYPE*
CAPABILI EQU CAPCOM+CAP55IO+CAPRIM+CAPDPIO+CAPAPF+CAPBLUE+CAPIMA+CAPMICR
*
* LOCATION OF THE CODE IN ROMS IS AS FOLLOWS (MSB & LSB OF COURSE)
*
PROC EQU 00<9 EMULATION SUPPORT CODE IN ROMS 0 & 1
PROD EQU 02<9 EMULATION SUPPORT CODE IN ROMS 2 & 3
FLEX EQU 04<9 MICRO-BUS CODE IN ROMS 4 & 5
CDOX EQU 06<9 COMM TRANSMIT CODE IN ROM 6
CDOR EQU 07<9 COMM RECEIVE CODE IN ROM 7

* CAPIVS EQU 0
PRE EQU '1' RELEASE LEVEL (FINAL IS BINARY ZERO)
*
CAPIVS EQU 0 INVERTED DISPLAY SCREEN VERSION **NEW**
* 0 = NORMAL, 1 = INVERTED (PURE RASTER!)
*
. 2.14.I HJS 2 APR 80 UPDATE TO ALL (0..4) VERSIONS OF MACHINE

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• EXTENDED CONDITIONS, AND SYSTEM REGISTER DEFINITIONS

5.  
6. \* . 2.13.B HJS 7 FEB 79 ALLOW COMM ON 3800'S (AFTER V13)  
7.  
8. \* . 2.12.C HJS 13 OCT 78 DELETE CHECKING OF CORRECT VERSION/REV  
9.  
10. \* . 2.9.K HJS 18 APR 78 CHANGE FOR RELOCATABLE LINK & CORRECT LODCF NAME  
11. . 2.9.J HJS 20 MAR 78 SETUP FOR 1800/3800 DIFFERENCES  
12. . 2.9.A HJS 14 NOV 77 ADD NEW SYSTAT INSTRUCTION  
13.  
14. \* . 2.8.A HJS 16 SEP 77 DUE TO UPDATE OF OTHER FILES  
15.  
16. \* . 2.7. HJS 7 SEP 77 FINAL ADDRESSING SETUP FOR RELEASE  
17.  
18. \* . 2.5.C HJS 18 AUG 77 CHANGE /EPT FILE FOR VERSION CONTROL  
19. . 2.5.A HJS 13 JULY 77 BRING UP TO VRP FORMAT FOR THE FILE  
20.  
21. 000000 PID ORG 0  
22. 000000 PID USE PID

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
 • EMULATOR JUMP TABLE FOR 1800/3800 AND ALL VARIATIONS.

|     |         |        |    |         |                                 |
|-----|---------|--------|----|---------|---------------------------------|
| 25. | 000000  | JMPTBL | DA | *UDPOP  | 000 HALT                        |
| 26. | >000000 |        | DA | *UDPOP  | 001 HALT                        |
| 27. | >000002 |        | DA | *SLC    | 002 SHIFT LEFT                  |
| 28. | >000004 |        | DA | *RETCC  | 003 RFC                         |
| 29. | >000006 |        | DA | *AP4    | 004 IMM ADD                     |
| 30. | >000010 |        | DA | *INCX   | 005 INCREMENT INDEX <RP> OR MEM |
| 31. | >000012 |        | DA | *LD6    | 006 IMM LA                      |
| 32. | >000014 |        | DA | *RETURN | 007 SUBROUTINE RETURN           |
| 33. | >000016 | *      | DA | *INFO   | 010 INFORMATION PLEASE          |
| 34. |         | *      | DA | *BFAC   | 011 BINARY FIELD ADD            |
| 35. | >000020 |        | DA | *SRC    | 012 SHIFT RIGHT                 |
| 36. | >000022 |        | DA | *RETCC  | 013 RFZ                         |
| 37. | >000024 |        | DA | *AP4    | 014 IMM ADD WITH CARRY          |
| 38. | >000026 |        | DA | *INCP   | 015 INCR REG PAIR (BY 1 OR 2)   |
| 39. | >000030 |        | DA | *LD6    | 016 IMM LB                      |
| 40. | >000032 |        | DA | *INCPA  | 017 INCR REG PAIR BY REG A      |
| 41. | >000034 | *      | DA | *BETA   | 020 SWITCH MODES                |
| 42. | >000036 | *      | DA | *BT     | 021 BLOCK TRANSFER & TRANSLATE  |
| 43. |         | *      | DA | *SIRO   | 022 SELECT XA PAIR              |
| 44. | >000040 |        | DA | *RETCC  | 023 RFS                         |
| 45. | >000042 |        | DA | *AP4    | 024 IMM SUB                     |
| 46. | >000044 |        | DA | *DECX   | 025 DECREMENT INDEX <RP> OR MEM |
| 47. | >000046 |        | DA | *LD6    | 026 IMM LC                      |
| 48. | >000050 |        | DA | *DS     | 027 DOUBLE STORE                |
| 49. | >000052 | *      | DA | *ALPHA  | 030 SWITCH MODES                |
| 50. | >000054 | *      | DA | *BFSB   | 031 BINARY FIELD SUBTRACT       |
| 51. | >000056 | *      | DA | *SRE    | 032 SHIFT RIGHT EXTENDED        |
| 52. |         | *      | DA | *RETCC  | 033 RFP                         |
| 53. | >000060 |        | DA | *AP4    | 034 IMM SUB WITH CARRY          |
| 54. | >000062 |        | DA | *DECP   | 035 DECCR REG PAIR              |
| 55. | >000064 |        | DA | *LD6    | 036 IMM LD                      |
| 56. | >000066 |        | DA | *DECRA  | 037 DECR PAIR USING A           |
| 57. | >000070 |        |    |         |                                 |
| 58. | >000072 |        |    |         |                                 |
| 59. | >000074 |        |    |         |                                 |
| 60. | >000076 |        |    |         |                                 |

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52

• EMULATOR JUMP TABLE FOR 1800/3800 AND ALL VARIATIONS.

|                     |   |    |        |     |   |
|---------------------|---|----|--------|-----|---|
| 61.                 |   |    |        |     |   |
| 62. >000100 000 000 |   | DA | *DI    | 040 | DISABLE INTERRUPTS                          |
| 63. >000102 000 000 |   | DA | *BCP   | 041 | BLOCK COMPARE, DECIMAL FIELD ADD & SUBTRACT |
| 64. >000104 000 000 |   | DA | *CCS   | 042 | CONDITION CODE SAVE                         |
| 65. >000106 000 000 |   | DA | *RETCC | 043 | RTC   |
| 66. >000110 000 000 |   | DA | *AP4   | 044 | IMM AND                                     |
| 67. >000112 000 000 |   | DA | *NOJ   | 045 | NON-JUMP NO-OP                              |
| 68. >000114 000 000 |   | DA | *LD6   | 046 | IMM LE                                      |
| 69. >000116 000 000 |   | DA | *DL    | 047 | DOUBLE LOAD                                 |
| 70.                 | * |    |        |     |   |
| 71. >000120 000 000 | * | DA | *EI    | 050 | ENABLE INTERRUPTS, AND JUMP & RETURN        |
| 72. >000122 000 000 | * | DA | *PUSHI | 051 | PUSH IMMEDIATE                              |
| 73. >000124 000 000 | * | DA | *BP    | 052 | BREAKPOINT                                  |
| 74. >000126 000 000 | * | DA | *RETCC | 053 | RTZ   |
| 75. >000130 000 000 | * | DA | *AP4   | 054 | IMM EXCLUSIVE OR                            |
| 76. >000132 000 000 | * | DA | *REGS  | 055 | REGISTER SAVE & LOAD                        |
| 77. >000134 000 000 | * | DA | *LD6   | 056 | IMM LH                                      |
| 78. >000136 000 000 | * | DA | *DLHL  | 057 | DOUBLE LOAD HL USING (HL)                   |
| 79.                 | * |    |        |     |   |
| 80. >000140 000 000 | * | DA | *POP   | 060 | POP FROM STACK                              |
| 81. >000142 000 000 | * | DA | *MIN   | 061 | MULTIPLE INPUT                              |
| 82. >000144 000 000 | * | DA | *SIRX  | 062 | SELECT C OR BC PAIR                         |
| 83. >000146 000 000 | * | DA | *RETCC | 063 | RTS   |
| 84. >000150 000 000 | * | DA | *AP4   | 064 | IMM INCLUSIVE OR                            |
| 85. >000152 000 000 | * | DA | *STKS  | 065 | STACK SAVE, LOAD & MOVE                     |
| 86. >000154 000 000 | * | DA | *LD6   | 066 | IMM LL                                      |
| 87. >000156 000 000 | * | DA | *SC    | 067 | SYSTEM CALL                                 |
| 88.                 | * |    |        |     |   |
| 89. >000160 000 000 | * | DA | *PUSH  | 070 | PUSH FROM STACK                             |
| 90. >000162 000 000 | * | DA | *MOUT  | 071 | MULTIPLE OUTPUT                             |
| 91. >000164 000 000 | * | DA | *BRL   | 072 | BASE REGISTER LOAD                          |
| 92. >000166 000 000 | * | DA | *RETCC | 073 | RTP   |
| 93. >000170 000 000 | * | DA | *AP4   | 074 | IMM COMPARE                                 |
| 94. >000172 000 000 | * | DA | *BFS   | 075 | BINARY FIELD SHIFT LEFT & RIGHT             |
| 95. >000174 000 000 | * | DA | *LD6   | 076 | IMM LX                                      |
| 96. >000176 000 000 | * | DA | *STL   | 077 | SECTOR TABLE LOAD                           |

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• EMULATOR JUMP TABLE FOR 1800/3800 AND ALL VARIATIONS.

|              |         |    |          |   |
|--------------|---------|----|----------|---|
| 97.          |         |    |          |   |
| 98. >000200  | 000 000 | DA | *JUMPCC  | 100 JFC                                     |
| 99. >000202  | 000 000 | DA | *INPUT   | 101 INPUT FROM 5500 I/O BUS                 |
| 100. >000204 | 000 000 | DA | *CALLCC  | 102 CFC, USER MODE RETURN (102-172 BY 10'S) |
| 101. >000206 | 000 000 | DA | *PIN     | 103 PARITY CHECKING INPUT                   |
| 102. >000210 | 000 000 | DA | *JUMP    | 104 JUMP UNCONDITIONAL                      |
| 103. >000212 | 000 000 | DA | *PLR     | 105 PL A,                                   |
| 104. >000214 | 000 000 | DA | *CALL    | 106 CALL UNCONDITIONAL                      |
| 105. >000216 | 000 000 | DA | *PSR     | 107 PS A,                                   |
| 106.         |         | *  |          |   |
| 107. >000220 | 000 000 | DA | *JUMPCC  | 110 JFZ                                     |
| 108. >000222 | 000 000 | DA | *SIRX    | 111 SELECT B                                |
| 109. >000224 | 000 000 | DA | *CALLCC  | 112 CFZ                                     |
| 110. >000226 | 000 000 | DA | *SIRX    | 113 SELECT D                                |
| 111. >000230 | 000 000 | DA | *PLR     | 114 PL B,                                   |
| 112. >000232 | 000 000 | DA | *SIRX    | 115 SELECT H                                |
| 113. >000234 | 000 000 | DA | *PSR     | 116 PS B,                                   |
| 114. >000236 | 000 000 | DA | *SIRX    | 117 SELECT X                                |
| 115.         |         | *  |          |   |
| 116. >000240 | 000 000 | DA | *JUMPCC  | 120 JFS                                     |
| 117. >000242 | 000 000 | DA | *EXADR   | 121 EX ADR                                  |
| 118. >000244 | 000 000 | DA | *CALLCC  | 122 CFS                                     |
| 119. >000246 | 000 000 | DA | *EXSTAT  | 123 EX STATUS                               |
| 120. >000250 | 000 000 | DA | *PLR     | 124 PL C, & DPL BC,                         |
| 121. >000252 | 000 000 | DA | *EXDATA  | 125 EX DATA                                 |
| 122. >000254 | 000 000 | DA | *PSR     | 126 PS C, & DPS BC,                         |
| 123. >000256 | 000 000 | DA | *EXWRITE | 127 EX WRITE                                |
| 124.         |         | *  |          |   |
| 125. >000260 | 000 000 | DA | *JUMPCC  | 130 JFP                                     |
| 126. >000262 | 000 000 | DA | *EXCOM1  | 131 EX COM1                                 |
| 127. >000264 | 000 000 | DA | *CALLCC  | 132 CFP                                     |
| 128. >000266 | 000 000 | DA | *EXCOM2  | 133 EX COM2                                 |
| 129. >000270 | 000 000 | DA | *PLR     | 134 PL D,                                   |
| 130. >000272 | 000 000 | DA | *EXCOM3  | 135 EX COM3                                 |
| 131. >000274 | 000 000 | DA | *PSR     | 136 PS D,                                   |
| 132. >000276 | 000 000 | DA | *EXCOM4  | 137 EX COM4                                 |

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• EMULATOR JUMP TABLE FOR 1800/3800 AND ALL VARIATIONS.

|              |         |  |                     |   |  |
|--------------|---------|--|---------------------|---|--|
| 133.         |         |  |                     |   |  |
| 134. >000300 | 000 000 |  | DA *JUMPCC          | 140 JTC                                     |  |
| 135.         |         |  | IFS CAPMICR         | ** DISKETTE - 1800, 1871 **                 |  |
| 141.         |         |  | XIF                 |   |  |
| 142.         |         |  | IFS CAPDPIO         | ** DMP BUS INTERFACE - 3802 **              |  |
| 148.         |         |  | XIF                 |   |  |
| 149.         |         |  | IFC CAPMICR+CAPDPIO | ** NON-DISKETTE - 3800 & 38MP **            |  |
| 150. >000302 | 000 000 |  | DA *UDOP            | 141 FXIO - FLOPPY SUBSYSTEM INSTRUCTIONS    |  |
| 151. >000304 | 000 000 |  | DA *CALLCC          | 142 CTC                                     |  |
| 152. >000306 | 000 000 |  | DA *UDOP            | 143 FXSTAT - FLOPPY SUBSYSTEM STATUS        |  |
| 153. >000310 | 000 000 |  | DA *PLR             | 144 PL E, & DPL DE,                         |  |
| 154. >000312 | 000 000 |  | DA *UDOP            | 145 MXIO - MICRO-BUS INTERFACE INSTRUCTIONS |  |
| 155.         |         |  | XIF                 |   |  |
| 156. >000314 | 000 000 |  | DA *PSR             | 146 PS E, & DPS DE,                         |  |
| 157.         |         |  | IFS CAPAPF          | ** HONEYWELL - 1871 **                      |  |
| 159.         |         |  | XIF                 |   |  |
| 160.         |         |  | IFS CAPDPIO         | ** DMP BUS INTERFACE - 3802 **              |  |
| 162.         |         |  | XIF                 |   |  |
| 163.         |         |  | IFC CAPAPF+CAPDPIO  |   |  |
| 164. >000316 | 000 000 |  | DA *UDOP            | 147 DECK I/O                                |  |
| 165.         |         |  | XIF                 |   |  |
| 166.         |         |  | *                   |   |  |
| 167. >000320 | 000 000 |  | DA *JUMPCC          | 150 JTZ                                     |  |
| 168. >000322 | 000 000 |  | DA *BEEP            | 151 EX BEEP                                 |  |
| 169. >000324 | 000 000 |  | DA *CALLCC          | 152 CTZ                                     |  |
| 170. >000326 | 000 000 |  | DA *CLICK           | 153 EX CLICK                                |  |
| 171. >000330 | 000 000 |  | DA *PLR             | 154 PL E,                                   |  |
| 172. >000332 | 000 000 |  | DA *LODCF           | 155 LOAD CHARACTER FONT - EX DECK1          |  |
| 173. >000334 | 000 000 |  | DA *PSR             | 156 PS E,                                   |  |
| 174. >000336 | 000 000 |  | DA *SYSTAT          | 157 SYSTEM STATUS                           |  |
| 175.         |         |  | *                   |   |  |
| 176. >000340 | 000 000 |  | DA *JUMPCC          | 160 JTS                                     |  |
| 177.         |         |  | IFS CAPCOM          | ** ICA - 1800, 1871, 3800 **                |  |
| 185.         |         |  | XIF                 |   |  |
| 186.         |         |  | IFC CAPCOM          | ** NON-ICA - 3802, 38MP **                  |  |
| 187. >000342 | 000 000 |  | DA *UDOP            | 161 MODEM-ACU CONTROL-STATUS I/O            |  |
| 188. >000344 | 000 000 |  | DA *CALLCC          | 162 CTS                                     |  |
| 189. >000346 | 000 000 |  | DA *UDOP            | 163 INPUT BY UNLOADING RECEIVE BUFFER       |  |
| 190. >000350 | 000 000 |  | DA *PLR             | 164 PL L, & DPL HL,                         |  |
| 191. >000352 | 000 000 |  | DA *UDOP            | 165 START COMMUNICATIONS                    |  |
| 192. >000354 | 000 000 |  | DA *PSR             | 166 PS L, & DPS HL,                         |  |
| 193. >000356 | 000 000 |  | DA *UDOP            | 167 OUTPUT TO LOAD TRANSMIT BUFFER          |  |
| 194.         |         |  | XIF                 |   |  |

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|                      |     |          |                         |
|----------------------|-----|----------|-------------------------|
| 195.                 | *   |          |                         |
| 196. >000360 000 000 | DA  | *JUMPCC  | 170 JTP                 |
| 197.                 | IFS | CAPDMPIO | ** DMP-BUS - 3802 **    |
| 201.                 | XIF |          |                         |
| 202.                 | IFC | CAPDMPIO | ** DMP-BUS - 3802 **    |
| 203. >000362 000 000 | DA  | *UDOP    | 171 EX SF               |
| 204. >000364 000 000 | DA  | *CALLCC  | 172 CTP                 |
| 205. >000366 000 000 | DA  | *UDOP    | 173 EX SB               |
| 206.                 | XIF |          |                         |
| 207. >000370 000 000 | DA  | *SIRX    | 174 SELECT E OR DE PAIR |
| 208. >000372 000 000 | DA  | *UDOP    | 175 EX REWIND           |
| 209. >000374 000 000 | DA  | *SIRX    | 176 SELECT L            |
| 210.                 | IFC | CAPAPF   |                         |
| 211. >000376 000 000 | DA  | *UDOP    | 177 EX TSTOP            |
| 212.                 | XIF |          |                         |
| 213.                 | IFS | CAPAPF   |                         |
| 215.                 | XIF |          |                         |
| 216.                 |     |          |                         |

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• INSTRUCTION DECODE FOR ARITHMETICS AND SIMPLE LOADS

219.  
 220. .MACRO.  
 221. .MACRO.  
 222. .MACRO.  
 223. .MACRO.  
 224. .MACRO.  
 225. .MACRO.  
 226. .MACRO.  
 227. .MACRO.  
 228. .MACRO.  
 229. .MACRO.  
 230. .MACRO.  
 231. .MACRO.  
 232. .MACRO.  
 233.  
 234.  
 235. >000400 000 000 000 000 000      \*  
       >000405 000 000 000 000 000  
       >000412 000 000 000 000 000  
       >000417 000  
 235. >000420 000 000 000 000 000      SEVPI AP,S,7  
       >000425 000 000 000 000 000  
       >000432 000 000 000 000 000  
       >000437 000  
 235. >000440 000 000 000 000 000      SEVPI AP,S,7  
       >000445 000 000 000 000 000  
       >000452 000 000 000 000 000  
       >000457 000  
 235. >000460 000 000 000 000 000      SEVPI AP,S,7  
       >000465 000 000 000 000 000  
       >000472 000 000 000 000 000  
       >000477 000  
 235. >000500 000 000 000 000 000      SEVPI AP,S,7  
       >000505 000 000 000 000 000  
       >000512 000 000 000 000 000  
       >000517 000  
 235. >000520 000 000 000 000 000      SEVPI AP,S,7  
       >000525 000 000 000 000 000  
       >000532 000 000 000 000 000  
       >000537 000  
 235. >000540 000 000 000 000 000      SEVPI AP,S,7  
       >000545 000 000 000 000 000  
       >000552 000 000 000 000 000  
       >000557 000  
 235. >000560 000 000 000 000 000      SEVPI AP,S,7  
       >000565 000 000 000 000 000  
       >000572 000 000 000 000 000  
       >000577 000

\* MACRO  
 SEVPI NAM,A,B,NUM(7),N2  
 RPT NUM  
 DA \*NAM1A  
 MIFS N2  
 DA \*FETCHI  
 RPT N2  
 DA \*NAM1A  
 MXIF  
 MIFS B  
 DA \*NAM1B  
 MXIF  
 MEND

\* RPT 8      2XX ARITH'S  
 SEVPI AP,S,7

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MICRO-PROCESSOR INSTRUCTION DECODE ROM - HJS - 07AUG82 15:52  
• INSTRUCTION DECODE FOR ARITHMETICS AND SIMPLE LOADS

|              |                     |          |                  |                  |
|--------------|---------------------|----------|------------------|------------------|
| 236.         |                     |          |                  |                  |
| 237. >000600 | 000 000             |          |                  |                  |
| 238. >000602 | 000 000 000 000 000 | DA SEVP1 | *FETCHI LD,S,7,6 | 300 NO-OP<br>30X |
| >000607      | 000 000 000 000 000 |          |                  |                  |
| >000614      | 000 000 000 000     |          |                  |                  |
| 239. >000620 | 000 000 000 000 000 | SEVP1    | LD,S,7,1,5       | 31X              |
| >000625      | 000 000 000 000 000 |          |                  |                  |
| >000632      | 000 000 000 000 000 |          |                  |                  |
| >000637      | 000                 |          |                  |                  |
| 240. >000640 | 000 000 000 000 000 | SEVP1    | LD,S,7,2,4       | 32X              |
| >000645      | 000 000 000 000 000 |          |                  |                  |
| >000652      | 000 000 000 000 000 |          |                  |                  |
| >000657      | 000                 |          |                  |                  |
| 241. >000660 | 000 000 000 000 000 | SEVP1    | LD,S,7,3,3       | 33X              |
| >000665      | 000 000 000 000 000 |          |                  |                  |
| >000672      | 000 000 000 000 000 |          |                  |                  |
| >000677      | 000                 |          |                  |                  |
| 242. >000700 | 000 000 000 000 000 | SEVP1    | LD,S,7,4,2       | 34X              |
| >000705      | 000 000 000 000 000 |          |                  |                  |
| >000712      | 000 000 000 000 000 |          |                  |                  |
| >000717      | 000                 |          |                  |                  |
| 243. >000720 | 000 000 000 000 000 | SEVP1    | LD,S,7,5,1       | 35X              |
| >000725      | 000 000 000 000 000 |          |                  |                  |
| >000732      | 000 000 000 000 000 |          |                  |                  |
| >000737      | 000                 |          |                  |                  |
| 244. >000740 | 000 000 000 000 000 | SEVP1    | LD,S,,6          | 36X              |
| >000745      | 000 000 000 000 000 |          |                  |                  |
| >000752      | 000 000             |          |                  |                  |
| 245. >000754 | 000 000             | DA       | *FETCHI          | 366 NO-OP        |
| 246. >000756 | 000 000             | DA       | *LD7             | 367 LLM          |
| 247. >000760 | 000 000 000 000 000 | SEVP1    | L7,S             | 37X              |
| >000765      | 000 000 000 000 000 |          |                  |                  |
| >000772      | 000 000 000 000 000 |          |                  |                  |
| 248. >000776 | 000 000             | DA       | *UDPOP           | 377 HALT!        |
| 249.         |                     | END      |                  |                  |

\*\*\* ERRORS: D

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|        |          |        |       |     |     |     |     |     |
|--------|----------|--------|-------|-----|-----|-----|-----|-----|
| 010017 | ACCTL    | *56:I  |       |     |     |     |     |     |
| 010015 | ACD      | *53:I  |       |     |     |     |     |     |
| 010017 | ACPH     | *55:I  | 56:I  |     |     |     |     |     |
| 010016 | ACPL     | *54:I  |       |     |     |     |     |     |
|        | ALPHA    | 53     |       |     |     |     |     |     |
|        | AP4      | 30     | 39    | 48  | 57  | 66  | 75  | 84  |
|        | AP7      | 235    |       |     |     |     |     | 93  |
| 010014 | APFRK    | *47:I  |       |     |     |     |     |     |
| 010013 | APFRP    | *46:I  |       |     |     |     |     |     |
| 010016 | APFTK    | *49:I  |       |     |     |     |     |     |
| 010015 | APFTP    | *48:I  |       |     |     |     |     |     |
|        | APS      | 235    |       |     |     |     |     |     |
|        | BCP      | 63     |       |     |     |     |     |     |
|        | BEEP     | 168    |       |     |     |     |     |     |
|        | BETA     | 44     |       |     |     |     |     |     |
|        | BFAC     | 36     |       |     |     |     |     |     |
|        | BFS      | 94     |       |     |     |     |     |     |
|        | BFSB     | 54     |       |     |     |     |     |     |
|        | BP       | 73     |       |     |     |     |     |     |
| 020006 | BR       | *21:I  |       |     |     |     |     |     |
|        | BRL      | 91     |       |     |     |     |     |     |
|        | BT       | 45     |       |     |     |     |     |     |
|        | CALL     | 104    |       |     |     |     |     |     |
|        | CALLCC   | 100    | 109   | 118 | 127 | 151 | 169 | 188 |
| 000100 | CAP5510  | *121:I | 125:I |     |     |     |     | 204 |
| 000102 | CAPABILI | *125:I |       |     |     |     |     |     |
| 000000 | CAPAPF   | *118:I | 125:I | 157 | 163 | 210 | 213 |     |
| 000000 | CAPBLUE  | *117:I | 125:I |     |     |     |     |     |
| 000000 | CAPCOM   | *122:I | 125:I | 177 | 186 |     |     |     |
| 000000 | CAPDMPIO | *119:I | 125:I | 142 | 149 | 160 | 163 | 197 |
| 000002 | CAPIMA   | *116:I | 125:I |     |     |     |     | 202 |
| 000000 | CAPIVS   | *135:I | *20:A |     |     |     |     |     |
| 000000 | CAPMICR  | *115:I | 125:I | 135 | 149 |     |     |     |
| 000000 | CAPRIM   | *120:I | 125:I |     |     |     |     |     |
|        | CCS      | 64     |       |     |     |     |     |     |
| 007000 | CDOR     | *133:I |       |     |     |     |     |     |
| 006000 | CDOX     | *132:I |       |     |     |     |     |     |
|        | CLICK    | 170    |       |     |     |     |     |     |
| 030011 | COMMODE  | *75:I  |       |     |     |     |     |     |
|        | DECP     | 58     |       |     |     |     |     |     |
|        | DECPA    | 60     |       |     |     |     |     |     |
|        | DECX     | 49     |       |     |     |     |     |     |
|        | DI       | 62     |       |     |     |     |     |     |
|        | DL       | 69     |       |     |     |     |     |     |
|        | DLHL     | 78     |       |     |     |     |     |     |
|        | DS       | 51     |       |     |     |     |     |     |
|        | EI       | 71     |       |     |     |     |     |     |
|        | EXADR    | 117    |       |     |     |     |     |     |
|        | EXCOM1   | 126    |       |     |     |     |     |     |
|        | EXCOM2   | 128    |       |     |     |     |     |     |
|        | EXCOM3   | 130    |       |     |     |     |     |     |
|        | EXCOM4   | 132    |       |     |     |     |     |     |

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|        |         |        |     |     |     |     |     |     |
|--------|---------|--------|-----|-----|-----|-----|-----|-----|
|        | EXDATA  | 121    |     |     |     |     |     |     |
|        | EXSTAT  | 119    |     |     |     |     |     |     |
|        | EXWRITE | 123    |     |     |     |     |     |     |
|        | FETCHI  | 237    | 239 | 240 | 241 | 242 | 243 | 245 |
| 004000 | FLEX    | *131:I |     |     |     |     |     |     |
|        | INCP    | 40     |     |     |     |     |     |     |
|        | INCRA   | 42     |     |     |     |     |     |     |
|        | INCX    | 31     |     |     |     |     |     |     |
|        | INFO    | 35     |     |     |     |     |     |     |
|        | INPUT   | 99     |     |     |     |     |     |     |
| 020005 | IO      | *20:I  |     |     |     |     |     |     |
| 020004 | IZ      | *19:I  |     |     |     |     |     |     |
| 000000 | JMPTBL  | *25    |     |     |     |     |     |     |
|        | JUMP    | 102    |     |     |     |     |     |     |
|        | JUMPCC  | 98     | 107 | 116 | 125 | 134 | 167 | 176 |
| 010001 | KBSCNT  | *28:I  |     |     |     |     |     |     |
|        | L7S     | 247    |     |     |     |     |     |     |
|        | LD6     | 32     | 41  | 50  | 59  | 68  | 77  | 86  |
|        | LD7     | 238    | 239 | 240 | 241 | 242 | 243 | 246 |
|        | LDS     | 238    | 239 | 240 | 241 | 242 | 243 | 244 |
| 030000 | LINK    | *61:I  |     |     |     |     |     |     |
|        | LODCF   | 172    |     |     |     |     |     |     |
| 010003 | MADR    | *33:I  |     |     |     |     |     |     |
| 010004 | MBITS   | *34:I  |     |     |     |     |     |     |
| 010005 | MBSTAT  | *35:I  |     |     |     |     |     |     |
| 010006 | MCRCH   | *36:I  |     |     |     |     |     |     |
| 010007 | MCRCL   | *37:I  |     |     |     |     |     |     |
| 010010 | MDSKS   | *38:I  |     |     |     |     |     |     |
| 010011 | MDSKT   | *39:I  |     |     |     |     |     |     |
|        | MIN     | 81     |     |     |     |     |     |     |
| 020002 | MO      | *17:I  |     |     |     |     |     |     |
|        | MOUT    | 90     |     |     |     |     |     |     |
| 020003 | MP      | *18:I  |     |     |     |     |     |     |
| 010013 | MSECT   | *41:I  |     |     |     |     |     |     |
| 010012 | MTRAK   | *40:I  |     |     |     |     |     |     |
|        | NOJ     | 67     |     |     |     |     |     |     |
| 010000 | PDLNP   | *27:I  |     |     |     |     |     |     |
| 000000 | PID     | *22    |     |     |     |     |     |     |
|        | PIN     | 101    |     |     |     |     |     |     |
|        | PLR     | 103    | 111 | 120 | 129 | 153 | 171 | 190 |
|        | POP     | 80     |     |     |     |     |     |     |
| 000111 | PRE     | *18:A  |     |     |     |     |     |     |
| 000000 | PROC    | *129:I |     |     |     |     |     |     |
| 002000 | PROD    | *130:I |     |     |     |     |     |     |
|        | PSR     | 105    | 113 | 122 | 131 | 156 | 173 | 192 |
|        | PUSH    | 89     |     |     |     |     |     |     |
|        | PUSHI   | 72     |     |     |     |     |     |     |
| 010002 | Q       | *25:I  |     |     |     |     |     |     |
| 030010 | RCH0C   | *92:I  |     |     |     |     |     |     |
| 010014 | RCH0D   | *93:I  |     |     |     |     |     |     |
| 030012 | RCH1C   | *94:I  |     |     |     |     |     |     |
| 030013 | RCH1D   | *95:I  |     |     |     |     |     |     |

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